May 8, 1951 J. K. COCHRAN 2,552,150

APPARATUS FOR CONTROLLING YARN TENSION

Filed Oct. 5, 1948 2 Sheets-Sheet 1

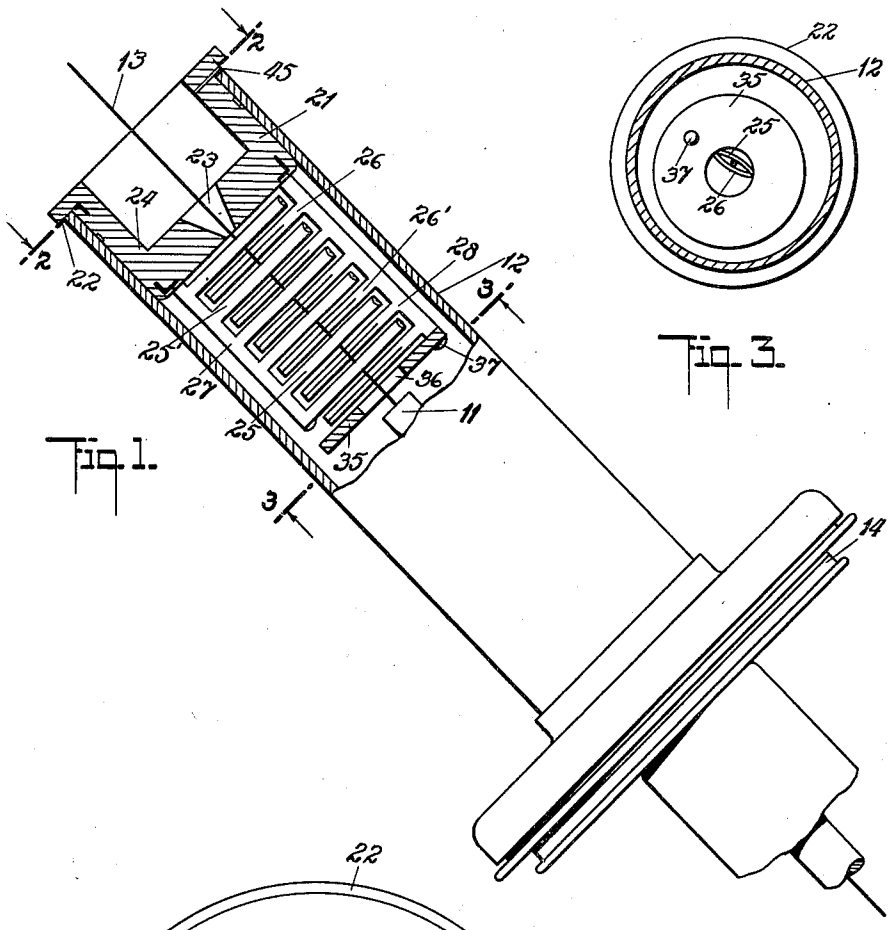


Fig. 1.

Fig. 3.

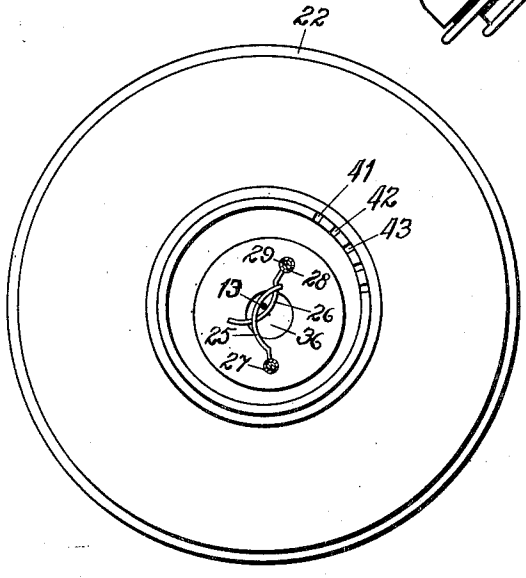


Fig. 2.

INVENTOR
JOHN K. COCHRAN
BY Darby & Darby
ATTORNEYS

May 8, 1951 J. K. COCHRAN 2,552,150

APPARATUS FOR CONTROLLING YARN TENSION

Filed Oct. 5, 1948 2 Sheets-Sheet 2

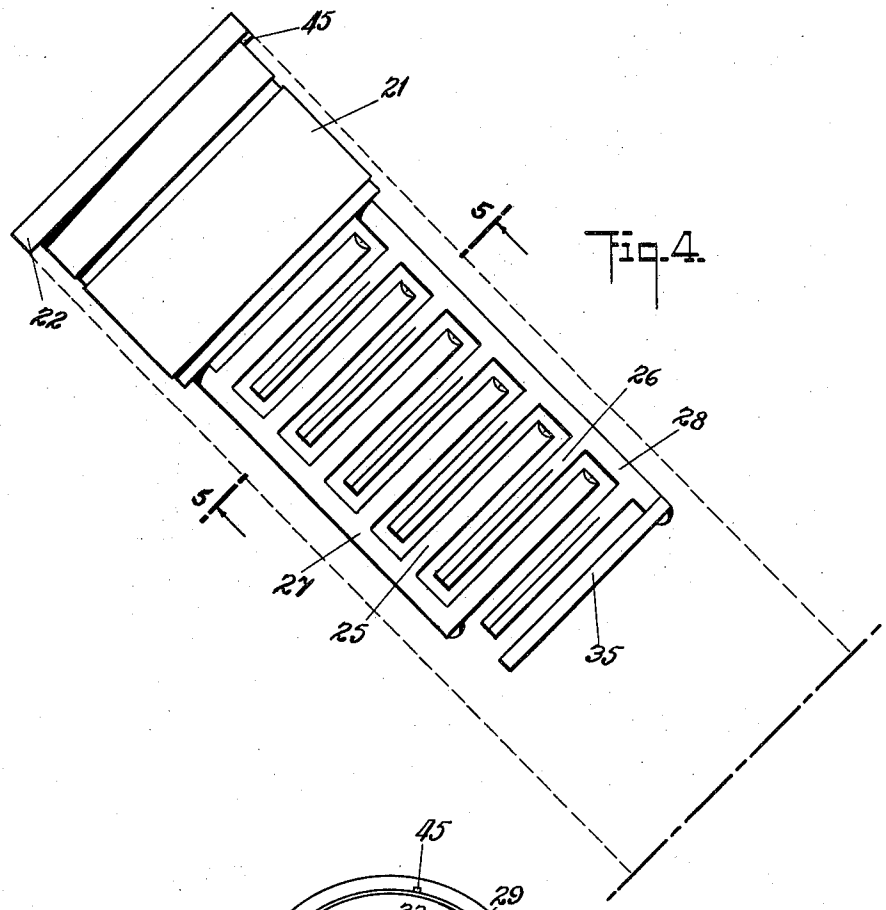


Fig. 4.

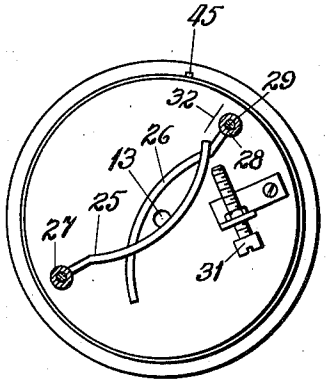


Fig. 5.

INVENTOR
JOHN K. COCHRAN
BY Darby & Darby
ATTORNEYS

Patented May 8, 1951

2,552,150

UNITED STATES PATENT OFFICE

2,552,150

APPARATUS FOR CONTROLLING YARN TENSION

John K. Cochran, Conyngham, Pa., assignor to The Duplan Corporation, Hazleton, Pa., a corporation of Delaware

Application October 5, 1948, Serial No. 52,935

3 Claims. (Cl. 242—154)

1

This invention relates to apparatus for spinning and twisting textile yarns and particularly to apparatus for controlling the tension of textile yarns in spinning and twisting operations.

Textile yarns are subjected to tensions in apparatus for spinning and twisting such yarns. This is particularly true in the apparatus for double twisting textile yarns in which the yarn passes downwardly through a hollowed spindle and outwardly at the lower portion thereof, thence upwardly to a takeup reel normally located above the spindle. Proper control of the tensions involved has been the subject of considerable study in the textile industry. The problem involved has been found to be difficult to solve satisfactorily, and has been the cause of serious concern to those skilled in the art.

Therefore, it is the object of this invention to provide new and improved apparatus for controlling the tension in spinning and twisting textile yarns.

Other objects are to provide apparatus which is comparatively simple and thus commercially acceptable, yet which will prove to be a satisfactory solution to the yarn tension problem in twisting and spinning apparatus; to provide yarn tension control within the spindle assembly in double twist spinning operations; and to provide yarn tension control apparatus which readily opens for the initial manual threading and at the same time forms a guide for such threading and which closes for the spinning operation.

Further objects will be apparent after a study of the following description, claims and drawings, in which—

Figure 1 is a side elevational view of a yarn twisting spindle mounting assembly with portions of the assembly cut away to illustrate the apparatus in accordance with this invention mounted therein.

Figure 2 is a sectional view through 2—2 of Figure 1;

Figure 3 is a sectional view through 3—3 of Figure 1;

Figure 4 is a side elevational view of the apparatus of this invention showing in dotted lines the arrangement for mounting within a spindle assembly; and

Figure 5 is a view through 5—5 of Figure 4.

The spindle assembly illustrated in Figure 1 is typical of the type construction used for spinning and twisting textile yarns, although this construction may be modified considerably according to desires. The spindle 11 is mounted within this assembly and only the tip is shown in

2

the drawing. A yarn package support in the form of a cylindrical tube 12 is supported by the spindle construction and as may be seen, this supporting tube 12 extends well above the upper end of the spindle 11. The yarn 13 is passed from the supply bobbin in an overend relationship downwardly through the tube 12 and into and through the spindle 11 and it is emitted at the lower portion of the spindle where it is wrapped around a takeup disc 14. From the takeup disc 14 the yarn passes upwardly to a takeup reel (not shown) located above the spindle.

Apparatus for controlling the tensions on the yarn may be provided at numerous points along the path of the yarn from the supply spool to the takeup reel. One point for controlling yarn tensions is the takeup disc 14 and this is shown and claimed in more detail in a copending application by applicant entitled "Yarn Takeup Disc for a Double Twist Spindle" Serial No. 8,346.

An additional position for yarn tensioning control apparatus is that within the cylinder tube 12 above the upper end of the spindle 11. Such positioning has the advantage of controlling the tensions of the yarn within the spindle apparatus while being placed in a position which is readily accessible for adjustments when necessary. This apparatus thus has considerable advantage over prior art apparatus which have been mounted within the hollow spindle per se where considerable difficulties were involved both in manufacture and in adjustment.

In accordance with this invention, the yarn tensioning device having characteristics of the so-called washboard tension, is utilized. Suitable mounting means are provided, and in accordance with the preferred embodiment, this may take the form of a cup shaped member 21 having cylindrical sides with a flanged upper edge 22 as shown. The outer diameter of this cylindrical cup shaped member is approximately equal to the inner diameter of the cylindrical tube 12 so as to fit snugly therewithin. The outer diameter at the flange is equal to the outer diameter of the tube 12 so that the flange forms a shoulder against which the upper end of the tube 12 abuts, and thus provides a support for the mechanism mounted therein. In its preferred form, this supporting member 21 is closed at the base except that an opening 23 is provided at the center thereof. The opening 23 is provided for the passage of the yarn 13 and preferably is greater in diameter at its upper

end in order to simplify the initial threading of the yarn into the mechanism. The closed bottom end provides a base member 24 for the mounting of the tension apparatus as will hereinafter be described.

The tension device operating on the yarn comprises a plurality of laterally extending curved stationary fingers 25, 25', etc. interlocking or interposed with a plurality of laterally extending curved fingers 26, 26', etc. A suitable longitudinal support 27 is provided for supporting the fixed or stationary fingers 25. The longitudinal support 27 is rigidly mounted and may take the form of a rod attached at its upper end to the base 24 of the member 21, or it may take the form of an integral part of a metal stamping in which the support and the plurality of extending fingers are stamped from a metal plate.

The interposed fingers 26 are supported similarly by a suitable longitudinal support 28 which like the support 27 may take any one of different desired forms. The support 28, however, is in turn supported by a suitable longitudinal rod 29 shown more clearly in Figures 2 and 5. The rod 29 is rigidly attached at one end to the base 24 of the support 21. The supporting member 28 is pivotally mounted on the rod 29 so that pivoted lateral movement is provided for the fingers 26. In this way the fingers 25 and the fingers 26 may be interlocked by any desired and variable amount.

As mentioned previously, each of the fingers 25 and each of the fingers 26 is curved in the arc of a circle. The amount of curvature is not at all critical. With this curved arrangement, however, an oval path or space is provided when the fingers 25 and 26 are partially interlocked. Through this oval path the yarn 13 may pass as is shown more clearly in Figures 2 and 5.

Any preferred arrangement may be provided for controlling the amount of lateral movement of the pivotally mounted fingers 26. In the particular form shown, a suitable adjusting screw 31 is mounted in any preferred way to the base 24 of the supporting member 21 with the end of the screw extending toward the inner edge or end of either the pivoted longitudinal supporting member or one of the pivoted fingers 26. In this way lateral movement of the fingers is restricted in one direction by virtue of the end of the screw abutting against the supporting member 28 or the finger 26. This is shown clearly in Figure 5. It will be apparent that the screw is readily adjustable to control the amount of movement of the pivotally mounted fingers 26. In a preferred arrangement, this adjustment may be made so that the fingers 26 overlap the fingers 25, thus closing the oval opening through which the yarn 13 passes. In this way considerable frictional restriction, if desired, may be placed on the yarn as it passes through the tension device. Any desired abutting arrangement may be made to restrict lateral movement of the fingers 26 in the other direction. In the particular form shown a thin flat member 32 extends longitudinally with one end rigidly attached to the base 24 of the member 21 with a lateral extension sufficient to abut against a portion of the fingers 26. Thus lateral movement of the pivotally mounted fingers 26 is restricted within a desired arc.

Since there are many stresses and tensions involved or imparted to the yarn during the twisting operation, it is practically impossible to make any single adjustment for yarn tension control.

Any satisfactory yarn tension control must be in the form of self or automatic adjustment for different tensions which occur from time to time during the twisting operation.

An eccentric weight is provided in accordance with this invention to control automatically the tensions on the yarn, as other influencing factors modify these tensions from time to time. In the preferred embodiment, a circular weight 35 is mounted at the lower end of the washboard tension device or finger assembly. The particular shape or form of the weight is not critical. It should, however, if in circular form, have a suitable opening 36 provided in the longitudinal center thereof in order to permit the passage of the yarn therethrough into the spindle 11. The weight 35 is eccentrically mounted by rigidly attaching a suitable supporting rod 37 at one point near the outer circumference thereof. The rod 37 may be securely attached to the pivotal support 28 or other part of the assembly of pivotal fingers 26. In this way, the weight acts to cause overlapping of the pivotally mounted fingers 26 with the fixed fingers 25 when the assembly is mounted on a slant so that the forces of gravity may act on the eccentrically mounted weight. This arrangement works out very nicely in practice, since in the preferred embodiment of the commercial form, the spindle is mounted on a slant. The amount of force imparted by the weight will depend on the rotational position of the assembly so as to cause greater or less gravitational force on the eccentrically mounted weight. Thus if very little weight is required to impart the desired frictional restrictions on the yarn, the entire assembly is mounted in one rotational position so that there is a certain amount of gravitational force acting on the weight forcing the pivotally mounted fingers 26 into an overlapping position with the fixed fingers 25. If greater or less frictional restriction is desired on the yarn, then the washboard apparatus may be rotated one way or the other, as the case may be, to increase or decrease the gravitational pull on the eccentrically mounted weight 35. Thus the entire unit may be mounted in a desired rotational position for any given yarn weight. For instance if a light yarn is to be twisted, the assembly should be positioned so that there is little gravitational pull on the eccentrically mounted weight 35, reducing the tendency of the pivotal fingers 26 to close or overlap the fixed fingers 25. By contrast, however, if a heavy weight yarn is to be twisted there should be greater frictional control over the yarn as it passes through the assembly. In such instance, the entire washboard tension assembly is given a different rotational position so as to increase the gravitational pull on the eccentrically mounted weight 35 and thus increase the tendency for the pivotally mounted fingers 26 to overlap the fixed fingers 25 with the resultant greater pressure on the yarn 13 passing through the opening between the fingers.

In order to provide this necessary adjustment the upper end of the cylindrical tube 12 has a plurality of notches 41, 42, 43, etc., provided therein. Correspondingly a small projection 45 extends radially from the cylindrical side of the supporting member 21 immediately adjacent and under the shoulder or edge of the flange 22. In this way the projection 45 will slip into a corresponding notch 41, 42, 43, as the case may be, so as to provide a different rotational position to the washboard tension assembly. When the as-

sembly has been placed in any one position in accordance with the particular notch selected, it will remain until a different notch is selected for a new adjustment on a different weight yarn.

When the apparatus is to be threaded, the entire spindle may be rotated approximately 180°. In this position, the eccentrically mounted weight will cause the pivoted movable fingers to fall away or open up and thus provide a clear path for threading the yarn. At the same time, the curved fingers will form a guide for the threading tool or the yarn. When the spinning operation is to begin, the spindle assembly will automatically rotate into its operating position due to the action of the counterweight in the assembly which is normally provided to prevent the stationary parts from rotating when the assembly is mounted on a slant. Thus the tension control device will automatically return to its correct operating position, since when the spindle assembly rotates to its operating position, the eccentrically mounted weight on the tension device will cause the fingers to approach the overlapping position as previously described. Of course, it is apparent that if desired, the tension control device may be rotated within the spindle assembly for this threading operation. Rotating the entire assembly, however, has the advantage of being fool-proof from the standpoint of operator forgetfulness.

With this apparatus self adjusting tension is imparted to the yarn correcting variable tensions caused by other factors during the twisting operations. At the same time, a sufficient amount of manual adjustment is provided to compensate for the different or operating tensions required for different weight yarns. The apparatus provided is relatively simple in construction and is readily assembled in a commercial spindle apparatus so that manufacturing or servicing problems are reduced to a minimum.

The particular preferred embodiment shown has proved to be completely satisfactory for commercial operation. However, it will be apparent to those skilled in the art that modifications are possible without departing from the scope of the invention.

What is claimed is:

1. A device for spinning and twisting textile yarns comprising a spindle mounted at an angle and a yarn supply cylindrical supporting tube, said tube having a plurality of notches in the cylindrical surface thereof, a yarn tension control device rotatably mounted within said tube fixed in position by a radially extending member in one of said notches, said tension control device comprising a plurality of curved rigidly mounted laterally extending fingers and a plurality of curved pivotally mounted laterally extending fingers longitudinally interposed with said rigidly mounted fingers, and an eccentrically mounted weight attached to said pivotally mounted fingers to move therewith and to be acted on by gravity to cause said pivotally mounted fingers to interlace and laterally overlap said rigidly mounted fingers when said spindle and said control device are in operating position, said pivotally mounted fingers being in non-overlapping position when said control device is rotated substantially 180° to non-operating position, the amount of overlap and yarn tension being dependent on the selection of said notches for said radially extending member.

2. Apparatus for spinning and twisting textile yarns comprising a spindle mounted at an angle and a tension control device, said device comprising a set of rigidly mounted laterally extending fingers and a set of pivotally mounted laterally extending fingers mounted complementary to interlace and overlap said rigidly mounted fingers, a weight attached to said set of pivotally mounted fingers to be acted on by gravity when said control device is mounted at an angle within said spindle, and a keying arrangement to locate adjustably the rotational position of said control device to control the force of gravity on said weight, said fingers being in overlapping position when said device is in operating position and non-overlapping position when said device is rotated substantially 180° with respect to said spindle.

3. Apparatus for spinning and twisting textile yarns comprising a spindle mounted at an angle and a yarn tension control device, said device comprising a first set of a plurality of laterally extending fingers and a second set of a plurality of laterally extending fingers, one of said sets being pivotally mounted to interlace and overlap the other of said sets, said device being selectively rotationally mounted within said spindle, said fingers being in overlapping position when said device is rotationally in operating position and non-overlapping when said device is rotationally mounted substantially 180° with respect thereto.

JOHN K. COCHRAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
948,580	Schweiter	Feb. 8, 1910
1,156,927	Rand et al.	Oct. 19, 1915
2,115,268	Klein	Apr. 26, 1938
2,397,153	Naumann	Mar. 26, 1946